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ABSTRACT

This is a teacher's guide for a learning module designed to integrate environmental education into ninth- and tenth-grade chemistry classes. This module and a companion social studies module were pilot tested in Gwinnett County, Georgia in 1975-76. The module is divided into four parts. Part one provides a broad overview of unit content and proposes questions to stimulate student interest in environmental problems. Part two is intended to develop understanding of population dynamics. Part three deals with population and land use. Part four addresses the problems of waste disposal. This guide includes overall objectives, the module sequence, teacher preparation for class activities, suggested sequence of instruction, and suggested short-answer review quizzes. (BB)

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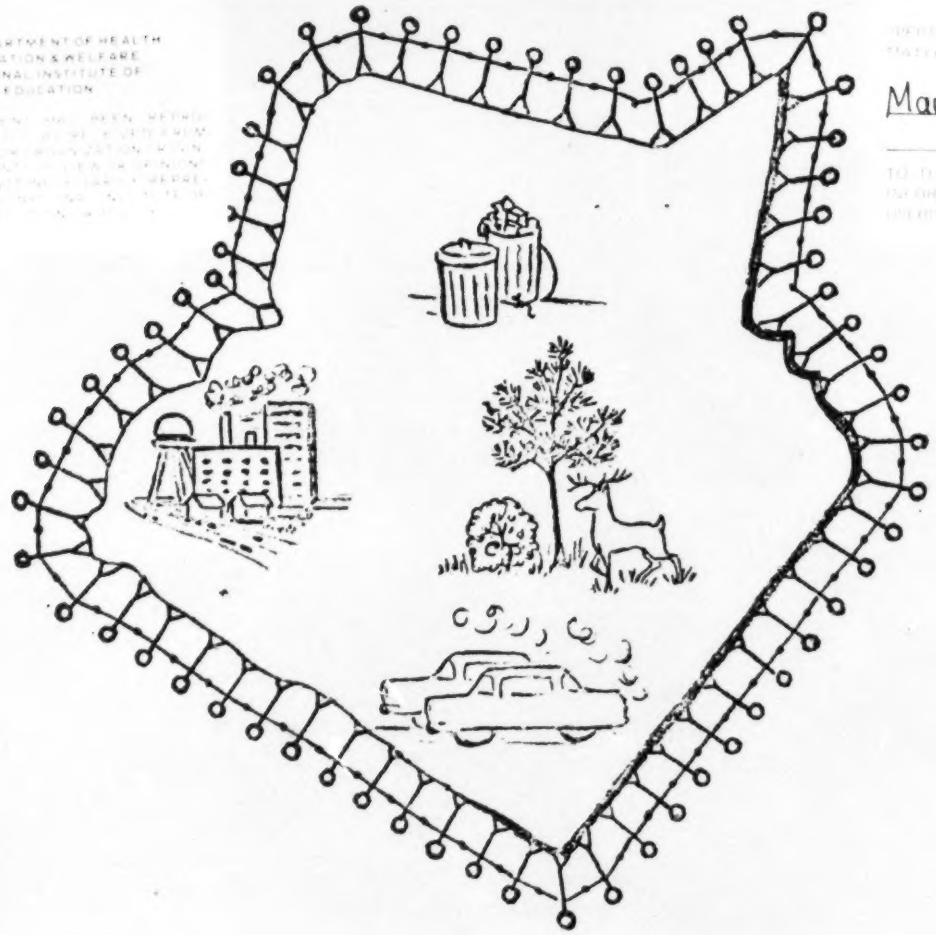
Science

GROWTH:



U.S. DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

Mary Hepburn

How Much Is Too Much??

TEACHER'S GUIDE

SE 024 441

TEACHER'S GUIDE

for

GROWTH: HOW MUCH IS TOO MUCH?

Science Module

(9th-10th grade Biology)

Pilot Tested in Gwinnett County, Georgia, 1975-1976

Developed by ENVIRONMENTAL EDUCATION FOR THE SECONDARY SCHOOLS, a curriculum project of the College of Education of the University of Georgia, Dr. Mary A. Hepburn, Director. This project (Project No. 522AH51215) was supported by the U.S. Office of Education under the Environmental Education Act. All rights reserved.

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Environmental Education for the Secondary Schools is a curriculum project which developed these instructional materials to help high school students respond intelligently to environmental policy issues. Utilizing local issues to stimulate interdisciplinary thinking and environmental problem solving, the modular materials are coordinated for social studies and natural science classes.

Project Team

Environmental Education for the Secondary Schools, 1975-1976

University of Georgia Staff:

Mary A. Hepburn, Director and Social Studies Coordinator
John W. Shrum, Science Coordinator
Marsha Scheppler, Social Studies Research Assistant
James E. Nix, Jr., Science Education Research Assistant
Carol Taylor, Science Education Research Assistant

Gwinnett County School District Coordinators and Teachers:

Richard M. Johnson, Director of Secondary Instruction
Betty Bentley, Vice-Principal, Berkmar High School
Kyle Vermillion, Materials Reviewer and Science Teacher
Dianne Bennett, Social Studies Teacher
Lynn Gatlin, Social Studies Teacher
Ruth Lewis, Science Department Head
Ruth Stockel, Social Studies Department Head

Teacher's Guide for Science Module, Growth: How Much is Too Much?

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Environmental Education for The Secondary Schools

Overall Objectives

Cognitive

Students will be able to:

-- define conditions of their environment in terms of interrelationships of the biotic and abiotic components

-- gather, organize and relate environmental data from science and social studies

-- relate first hand field investigation and experimentation to more abstract environmental knowledge

-- specifically delineate sources of population problems, water problems, land use problems and waste disposal problems in the county community

-- focus on public issues in selecting areas for scientific - environmental experimentation

-- utilize science knowledge in making social decisions

-- identify, examine and evaluate consequences of alternative public responses to given environmental problems and the potential trade-offs involved

-- determine channels for citizen action on specific issues and compare them

-- relate detailed knowledge of local environmental problems to environmental problems of the state and region

Affective

Students will:

-- demonstrate involvement in local environmental issues

-- demonstrate a commitment to using the knowledge and skills of science and social studies in analyzing environmental problems and determining action

-- express interest in other related problems of the state and national environment

-- demonstrate a rational, evaluative attitude toward making environmental choices

MODULES SEQUENCE

1. OPENING
   Immersion in Environmental Problems by Means of

   -- Dramatic Episode (Factual or Fictional Based on Fact)
   -- Perplexing Situation - News Reporting Style
   -- Visual series or a Visuals/Quotations Montage

2. INFORMATIONAL STAGE
   Build Foundations for Decision-Making by providing

   -- Data and Perspectives for building to summary statements or generalizations
   -- Summary statements for analysis and application to other sets of data
   -- Values "Situations"

3. UTILIZATION - OPPORTUNITY TO APPLY PREVIOUS LEARNING TO A PARTICULAR PROBLEM STUDIED IN MORE DEPTH

   -- Case Study or Detailed Report
   -- Comparative Study
   -- Multiple Perspectives

4. ACTION - EXPLORATION OF CHANNELS FOR INDIVIDUAL AND GROUP ACTION

   -- Individual Action
   -- Obtaining Information, Familiarity with Agencies of Research, Information and Service
   -- Interest Groups or Pressure Groups
   -- Publicity - Keeping Others Informed
   -- Civic Action - Using formal Political Channels to provide a public forum on the issue to bring about change and improvement

5. EVALUATION

   -- Evaluate learning outcomes
   -- Internal evaluation of modular instructional unit
   -- Estimate apparent community effects

Introduction and General Objectives

Part I

Without an understanding of concepts and processes of ecological interaction and behavior of populations, it is nearly impossible to analyze environmental problems.

"Getting the Feeling: Our Environment," provides a broad overview of unit content and proposes questions that will stimulate student interest in environmental problems. The activities are designed to identify issues and to begin a development of population growth models for both Man and other organisms.

Part II

"Getting the Facts, Populations," is intended to develop the student's understanding of population dynamics in order that he or she will be able to apply them in decision situations concerning land use and planning.

Part III

This section, "Getting into a Problem, the Land Use Question," gives students an opportunity to apply knowledge obtained about populations to human situations involving land use. The textual material and class activities concerning soils, introduce the student to the many physical considerations required to optimize land use planning.

Part IV

The final section, "Getting into the Act: A Land Use Problem," develops the concept of waste disposal as a land use issue. Major environmental considerations of liquid and solid waste disposal are discussed and other methods, such as recycling, are posed to the student. The simulation, "Zone of Contention," is the culminating activity. It allows students to develop alternative solutions to a realistic land use problem.

Suggested Sequence of Daily Class Activities

Part I

Objectives:

The student will:

1. Give a definition of ecology and describe its general relationship to himself.
2. Demonstrate the investigative nature of ecological science by conducting a population study with microorganisms.
3. Make logical deductions and predictions based upon experimental data from his own population study and those conducted by others.
4. Innoculate petri dishes with specified microorganisms, using sterile technique demonstrated in class.
5. Make microbe counts, using technique demonstrated in class.
6. Keep a daily log of experimental data, following format given in class.
7. Conduct a survey to determine the attitudes of local citizens concerning environmental issues.
8. Analyze simple experimental data in order to identify population parameters.

Day 1:

A. Lecture and discussion of text, "Ecology: What and Why."

B. Discuss the procedure of Class Activity, "Does Anyone Know or Care?" You may have time for students to interview each other.

C. Assign activity to be completed at home and due in two or three days.

D. Students should read, "The Limits of Growth," pp. 10-12 and be ready to discuss it the next class period.

Day 2:

A. Discuss questions 1-5 p. 11 and 1-2 p. 12.

B. Set up Class Acitivity "A Population Study Using Microbes, part A," pp. 13-14.

C. Each team should take a "census" of microbes.

D. Students should read "Characteristics of Populations" p. 17-22.

Part II

Objectives:

The student will:

1. Give a biological definition and identify characteristics of a population.
2. Identify the major determiners of population density and the effects of each.
3. Define natality and mortality verbally and explain how they are determined.
4. Compute natality and mortality rates for any population, when given appropriate data.
5. Distinguish between intraspecific and interspecific interactions.
6. Distinguish between biotic and abiotic components of environment.
7. Explain the relationship between biotic potential and environmental resistance.
8. Construct a growth curve for any population when given numbers of individuals per units of time and space.
9. Given a growth curve for any population explain the curve in terms of density determiners and carrying capacity.
10. Distinguish between density-dependent and density-independent limiting factors and give examples of each.

11. Given specific examples of limiting factors, hypothesize environmental effects.

12. Explain how density-dependent limiting factors work to stabilize population size.

13. Relate findings obtained in crowding experiments done with lower animals to situations in human populations and make predictions concerning the future of man.

14. Given any two populations and their relationship to each other, make predictions concerning their relative densities over a period of time.

15. Distinguish between the following types of interaction: commensalism, mutualism, parositism, predation and competition.

16. Given data or a graph concerning population fluctuations through interactions, draw logical conclusions and make reasonable predictions about the cause - and - effect.

17. Distinguish between populations, communities, and ecosystems.

18. Distinguish between habitat and niche.

19. Give definition of competitive exclusion principle and explain how it works.

20. Identify examples in the human community similar to the following: commensalism, mutualism, parositism, predation, competition, niche.

21. Give an example of ecological succession and describe some results of man's disruption of succession.

22. Explain a climax community and propose reasons for its stability.

23. Analyze a natural community.

Day 3:

A. Lecture and discussion of text," characteristics of populations," p. 17-22.

B. Each team should complete a population census.

C. Students should read "Environmental Influences" pp. 23-30 in text.

Day 4:

A. Lecture and discussion of text "Environmental Influences," pp. 23-30 of text.

B. Students should Take microbes census.

C. Have students read, "How Populations Interact" pp. 31-35.

Day 5:

A. Discuss "How Populations Interact," pp. 31-35.

B. Students should take microbes census.

C. Have students begin Class Activity "Population Fluctuations" pp. 36-37. May wish to have them complete it at home.

Day 6:

A. Lecture and discussion "Symbiosis," pp. 38-40.

B. Begin Class Activity "Symbiosis."

Day 7:

A. Complete Class Activity "Symbiosis."

B. Microbes census - final count.

C. Optional: Review Quiz No. 1.

D. Students should read, "The Big Picture and Ecological Succession," pp. 45-51.

Day 8:

A. Lecture and discussion of "The Big Picture and Ecological Succession," pp. 52-59.

B. This is a good time to assign Part B of Class Activity, "A Population Study Using Microbes."

Day 9:

A. Field Trip, An Investigation of a Local Community, pp. 51-52.

B. Film, see number 6 in teacher preparation.

C. Review Quiz No. 2.

D. Students should read, "The Land Use Question," pp. 56-65 in text.

Part III

Objectives:

The student will:

1. Identify factors to be considered when determining the optimal use of land.
2. Given specific instances of poor land-use planning, suggest plausible ways of correcting the damage.
3. Given pertinent information about any given development site and several suggested uses for the land, choose the "best" use and defend his/her choice.
4. Determine the moisture content of a given soil sample.
5. In the field, determine the percolation rate of a local soil type.
6. Define a soil profile and diagram at least three horizons.
7. List at least four soil characteristics which will help determine land use.

Day 10:

A. Discuss "The Land Use Question," pp. 56-65 in text.

B. Read, "What Kind of Soil," pp. 66-70.

NOTE: Soil Survey, Gwinnett County, Georgia is an excellent reference for information on local soil types. For sale by superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

Also available from the Soil Conservation Office in Lawrenceville (Contact Lloyd Harris.)

Day 11:

A. Lecture and discussion, "What Kind of Soil."

B. Begin class activity, Soil Moisture and Percolation Rate," p. 71-72.

Part IV

Objectives:

The student will:

1. Given specific instances of disruption of natural habitats and ecological succession by man, identify probable effects upon the abiotic environment and organisms other than man. Make plausible suggestions for reducing or eliminating harmful effects.

2. Locate and utilize appropriate sources of data needed in determining land use.

3. Outline some responsibilities of a citizen and alternatives for action in land use policy.

4. List three sources of wastes and discuss methods of waste disposal.

5. Participate as an interested party in a simulation of a county rezoning question.

Day 12:

A. Complete Soil Percolation Activity.

B. Students read pp. 74-85 in text and discuss waste disposal as a land use problem.

Day 13:

A. Go over questions on p. 73.

B. Prepare for simulation by having students read introduction. Explain the three stages of the game. Pass out role cards.

Day 14:

A. Simulation -- Hold first Zoning Board meeting (Stage I). Limit speakers to 5-8 minutes each.)

B. Special interest groups meet and plan their strategy.

Day 15:

A. Simulation -- Continue meeting of special interest groups to gather more information and prepare their arguments.

Day 16:

A. Simulation -- Public hearing is held by Zoning Board (Stage III). At least 15 minutes before the period is over, comments from the public should be halted to allow the Zoning Board to vote and make its decision.

Day 17: (optional)

If at all possible have students review and evaluate the simulation noting the points in contention, the restrictiveness of the county zoning ordinance, the environmental implications of the decision and how closely this simulation approximates realities in Gwinnett County.

Teacher Preparations for Class Activities

1. "Does Anyone Know or Care?" pp. 6-9.
   Run off enough "Activity Questionnaires" (on next page) so that each student will have a copy. Also, have enough Activity Data Sheets -- four or five per student and a tally sheet for each student.
   A sheet of poster board (2' x 3') could be good to make a large chart (p. 9) to display the class' results.

2. "The Limits of Growth" pp. 10-12 .
   No special materials or preparations are needed. Read over in preparation for discussion of Emlen experiments with class.

3. "A Population Study Using Microbes" pp. 13-15.
   Part A. This is an activity that can be carried on for many days. It is good to census the population of Paramecia daily for the first four or five days because the density tends to change quickly.
   The Paramecia may be purchased from several different biological supply houses or they may be established from local wild populations by isolation and culture.
   All necessary supplies and materials should be assembled four days prior to the beginning of the activity in order to allow the ciliate medium to grow an abundance of bacteria (for the Paramecia to graze).
   To prepare the medium you will need the following materials:

   1) one liter of pond water
   2) ciliate food in powdered form (available from various biological supply houses) or, 5 grams of chopped hay.
   3) 2 liter flask
   4) bunsen burner with stand
   5) 50 twenty ml test tubes
   6) cotton
   7) innoculating loop
   8) autoclave or pressure cooker
   9) hot plate or stove if using pressure cooker
   10) stirring rod
   11) metric balance
   12) pippette, 10 ml or some type of "tubing" apparatus
   13) 50, 9 cm diameter petri dishes, glass or plastic as long as sterile
   14) slant culture of Aerobacter aerogenes

   The objective is to prepare the medium, such that each student or group will have one test tube innoculated with Aerobacter aerogenes so that he may place the contents into a sterile petri dish. He will then add four or five drops of "Paramecium Stock Culture" to the dish and during the subsequent class periods, record the population growth.

(Copy Master)

ATTITUDE QUESTIONNAIRE

Directions: Read each question completely and choose your response from the alternatives given for that question. Place the letter of your answer in the appropriate blank on the separate response sheet. Please do no write on this page.

1. How do you feel about the recent rapid growth of population in Gwinnett County?

   a. The more, the better
   b. Something should be done to stop or slow it down
   c. It doesn't bother me

2. How would you feel about the possibility of 50,000 more people moving to Gwinnett in the next three or four years?

   a. It's good for the economy -- more people spend more money
   b. It would be terrible -- it is too crowded here already
   c. It doesn't matter -- we'll manage

3. Has the size of the population of Gwinnett changed much since 1970?

   a. Yes, we've almost doubled in size since 1970
   b. Yes, we've got a few (10 or 15,000) more people since 1970
   c. No, it's about the same as its always been

4. Do you see Gwinnett as having serious problems if 50,000 more people suddenly move here?

   a. Nothing more serious than longer lines at the supermarket or service station
   b. Very serious problems with things like disposing of garbage, getting sewage service, or just finding more room for them
   c. Nope

5. Have you attended any public hearings or county board meetings within the past year?

   a. Yes, several
   b. Once
   c. No

6. Have you expressed your opinions concerning population growth to any of your county officials?

   a. Yes, I've talked with some of them and have written letters to them or the newspaper.
   b. Yes, I've talked with one or more of them
   c. Yes, I've written to them or to the newspaper
   d. No I have not

Activity Data Sheet

Person Number _____

1. _____ 4. _____
2. _____ 5. _____
3. _____ 6. _____

Activity Data Sheet

Person Number _____

1. _____ 4. _____
2. _____ 5. _____
3. _____ 6. _____

Activity Data Sheet

Person Number _____

1. _____ 4. _____
2. _____ 5. _____
3. _____ 6. _____

Activity Data Sheet

Person Number _____

1. _____ 4. _____
2. _____ 5. _____
3. _____ 6. _____

DATA TALLY SHEET

	Person I	Person II	Person III	Person IV
Concerned				
Indifferent				
Informed				
Uninformed				

(Pop. Study Using Microbes - Continued)

We have found that the following procedure works well.

1. To one liter of pond water, add one gram of ciliate food or 10 grams of chopped hay.

2. Heat over a low flame until liquid boils. Remove from flame.

3. Stir for five minutes and allow to coll to a manageable temperature.

4. Fill each test tube with 10 ml of medium and plug with cotton. Sterilize at 15 pounds for 15 minutes with autoclave or pressure cooker.

5. When tubes are cooled to room temperature, innoculate with Aerobacter aerogenes using sterile technique.

6. Incubate tubes for 48 hours at 22 - 27° C.

7. Tubes will now contain millions of bacteria cells for the Paramecia to graze. Just add the contents of a tube to a petri dish along with a few drops of "Paramecium Stock Culture" and you can begin your census!

The petri dishes can be taped clowed with clear acetate tape to keep the spills to a minimum!

A good functional moisture chamber can be made from a plastic shoe box and some clear plastic wrap. Place a layer of moist paper towels in the bottom, add the petri dish cultures and cover with the plastic wrap. Put the lid on and this should keep evaporation from being a problem.

Part B. All that's needed here is some graph paper.

4. "Population Fluctuations Through Predation" pp. 36-37.
Again, graph paper will be needed by each student.
A short lesson in graphing on a two coordinate system may be helpful to some students.

5. "Study of Symbiosis" pp. 41-42.
Live termites can usually be collected in the field by searching in and under rotting logs, wood, etc. or purchased from supply houses.
Preserved tapeworms and stained whole mount slides may also be purchased from the same source.
The petri dishes containing sterile nutrient agar can be made up several days in advance and stored in plastic bags in the refrigerator.
To make a stock of nutrient agar medium, add 23 grams of nutrient agar to enough distilled water to make one liter volume.

Heat and stir until powder is dissolved. Carefully add warm medium to test tubes (10 ml medium per tube) and plug with cotton (30-50 per class).

Sterilize at 15 pounds for 15 minutes. Add a tube's contents to a sterile petri dish while agar is still a solid. Allow to cool and gel.

At the same time you are sterilizing tubes you may wish to also sterilize cotton swabs.

First, wrap 10-12 swaps in aluminum foil (about 50 in all) and place on top of tubes in rack. These will be used to remove microbes from skin and transfer to agar surface.

If you don't have an incubator, you may use room incubation, but it will probably take a day or two longer for colonies to develop. As will all microbes, special care should be used in sterile technique as some potential pathogenic strains could be grown in class. All plates and swaps should be sterilized or disinfected at the completion of the laboratory activities.

Saline solution for the termite study can be made by adding 9 grams of sodium chloride to distilled water and bring the final volume up to 1000 ml (one liter). This can be placed in dropper bottles for laboratory use.

6. Field Trip (or film(s)) pp. 51-52.

The trip doesn't have to be to an exotic area -- a local wood lot, old field or pond is fine.

It's good to survey the area prior to taking the class on the "outing" and be sure to get the owner's permission too.

Use the questions presented in the text so as to have some objectives in mind, also take along some plastic bags for specimens of a few of the common organisms for laboratory examination.

Check your local film library for related ecology or environmental films. An excellent free film from the U. S. Energy Research and Development Administration, is the "Endless Chain" available from their Technical Film Library in Oakridge, Tennessee. Be sure to write several weeks in advance.

7. "Soil Moisture and Percolation Rate" pp. 71-72.

The only specialized apparatus needed is a drying oven, which if one is not available can be fabricated from a few common materials.

Take an old foam ice chest and lid and using a pencil or screw driver make a hole in the center of the lid just large enough to secure a laboratory thermometer. At one of the lids place another hole, this time large enough to accomodate a standard extension cord plug (110 volt AC). Run the cord through the hole and attach a standard light socket with about a two hundred whatt light bulb. Tape the cord in place so that the bulb hangs freely inside the ice chest (but doesn't touch the sides or top). Make a few holes along the base of the cooler and lid for air circulation and then plug in the cord. Check the temperature because you may need to get a larger or smaller bulb to get close to 100°C.

NOTE: A very good source book for this activity and the subsequent simulation is soil survey, Gwinnett County, Georgia. For sale by the superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402 or your local U.S.D.A. Soil Conservation Service Office.

8. Simulation -- If the simulation is conducted jointly with the social studies class (same students), both the science and social studies periods can be utilized for two-three days.

   If the simulation is used only in science class, be sure to obtain a copy of The Zoning Resolution of Gwinnett County, Georgia from the county Department of Planning and Zoning in Lawrenceville. (A summary is included on the next few pages.)

   The Soil Survey, Gwinnett County, Georgia is an excellent source of information for people in several roles, e. g. Stanley, soil conservationist.

   At the back of this guide there are description sheets which can be xeroxed and cut and mounted on cards to distribute as role cards.

ZONING DISTRICTS -- GWINNETT COUNTY

The use of county land has been restricted by zoning ordinances. A summary of the zones and the general land use limitation is shown below. For more detailed and specific information on the zoning districts look in *The Zoning Resolution of Gwinnett County, Georgia* and its amendments issued by the Board of Commissioners of Gwinnett County.

RA200. Agriculture - Residence District - This district is comprised of land having a predominantly rural character. It is the intent of the regulations of this zoning district to discourage the subdivision of land for urban development requiring such urban services as a public water supply, sanitary sewers, fire protection and the like.

R100. One-Family Residence District - This zoning district is intended primarily for one-family residences except mobile homes and modular homes and related uses. School and churches may also be included.

R75. One-Family Residence District - This zoning district is intended primarily for moderate-cost one-family residences and related uses on land served by a central sewerage system. The development of lots in this district is permitted with septic tanks, provided lot sizes correspond to the area in square feet in the R100 District. All septic tank installations are subject to the approval of the Gwinnett County Health Department.

RL. Lakeside Residence District - The purpose of the RL. Lakeside Residence District, which borders on Lake Lanier, is to permit recreation cottages on medium-sized lots, and, as special exceptions, subject to the approval of the Zoning Board of Appeals after a public hearing, individual mobile homes and modular homes and water-related recreation areas and facilities.

RM Multi-Family Residence District - This zoning district is intended primarily for two-family and multi-family dwellings. The RM Zoning Districts are located where public water supply and sewerage facilities are available or can be obtained and where there is convenient access to collector streets, major streets or state or interstate highways. The multi-family dwellings may be duplexes, row houses, town houses or apartments.

MH Mobile Home District - This zoning district is intended exclusively for the placement of mobile homes in an environment that will provide pleasant and otherwise satisfactory living conditions and, at the same time, will not produce adverse effects upon neighboring properties. Within this district are permitted mobile home parks in which lots are leased.

HS. Hospital Service District - The purpose of the HS Hospital Service District is to provide a location for a hospital and related facilities that serve the hospital or benefit from a location in close proximity to it.

C1. Neighborhood Business District - The C1 Neighborhood Business District provides a location for convenience goods and services for people in near-by residential neighborhoods. Within the C1. Neighborhood Business District the following uses are permitted: any retail, financial or personal business or service providing convenience goods and services to near-by residential areas except drive-in eating places and places for the sale of wine or malt beverages.

C2. General Business District - The C2 General Business District is intended primarily for those commercial uses that require a location accessible to large numbers of people and that serve substantial portions of the community such as retail stores, veterinary clinics, funeral parlors, theaters, motels.

OI. Office Institutional District - This zoning district is established to provide a location for offices, institutions, and limited related retail business and service activities in buildings of high character in attractive surroundings. A building or land may be used for the following purposes: professional and business offices, public offices, semi-public institutions such as churches and clubs, cultural facilities, accessory retail business and service establishments such as restaurants and drug stores, accessory parking garages and parking lots.

M1. Light Industry District - The M1 Light Industry District is comprised of lands that are located on or have ready access to a major street or state highway and are well adapted to industrial development but whose proximity to residential or commercial districts makes it desirable to limit industrial operations and processes to those that are not objectionable by reason of the emission of noise, vibration, smoke, dust, gas, fumes, odors or radiation and that do not create fire or explosion hazards or other objectionable conditions

M2 Heavy Industry District - The M2 Heavy Industry District provides a location for those industrial operations and processes that are not public nuisances and are not dangerous to health, safety or the general welfare. The M2. heavy industry district shall be located on or have ready access to a major street or state highway. The following uses are permitted: all uses permitted in the M1. light industry district, all industrial uses that are not public nuisances and are not dangerous to the public health, safety or general welfare.

FH. Flood Hazard District - The FH Flood Hazard District is comprised of lands that are subject to periodic flooding. The intent of the regulation within this zoning district is to limit the use of such flood plain lands to: prevent flood damage to persons and properties and minimize expenditures for flood relief programs, flood control projects and flood damage repair, preserve drainage courses that will be adequate to carry storm water runoff from existing and future land developments, prohibit landfills or other obstructions to the flow of floodwaters, except those included in the special permitted uses listed in the resolution. Permit uses that are appropriate on flood-plains and utilize effectively this valuable county resource.

Let's see, what's the difference between an RM and an R-100?

SUGGESTED SHORT ANSWER QUIZZES

Quiz No. 1

Review of Parts I and II (Population Dynamics)

1. A population is a group of organisms

   a. of different species inhabiting the same locality
   b. of the same species inhabiting the same locality
   c. of the same species all the same age
   d. of different species all the same age

2. Which one of the following is an intraspecific interaction?

   a. bluebirds building a nest
   b. a fox preying on a rabbit
   c. a bluegill and a perch competing for a nestsite
   d. none of the above

3. Population density is

   a. the same as natality or birthrate
   b. the different between natality and mortality
   c. the number of individuals per unit area or volume of space occupied
   d. the same as mortality or death rate

4. A herd of deer produces 100 fawns during a two year period. What is the natality of the herd? The number of adults at the beginning of the period was 2000.

   a. 100 per year
   b. 20 per year
   c. 50 per year
   d. can not be determined from the information given

5. Which of the following is (are) not density-independent factor(s)?

   a. wide spread use of a pesticide such as DDT
   b. climatic factors such as rainfall, sunlight and temperature
   c. floods, huricanes, drought
   d. parasites, pathogens, predators

6. Predators that eat other animals are called

   a. carnivores
   b. herbivores
   c. grazers
   d. none of the above

7. The difference between the biotic potential and the actual growth rate is (are)

   a. the biotic factors
   b. the abiotic factors
   c. the environmental resistence
   d. none of the above

8. The type of interspecific interaction in which two species live together in a long term, relatively intimate association is known as

   a. predation
   b. symbiosis
   c. competition
   d. none of the above

9. Which of the following groups would be mutualistic?

   a. human beings and the bacteria that synthesize vitamin B-12 in their intestines
   b. the alga and fungus composing a lichen
   c. a farmer and his dairy herd
   d. all of the above are mutualistic

10. An important difference between a predator and a parasite is

   a. the parasite may slowly kill or never kill its host while a predator kills its prey quickly.
   b. the parasite is usually larger than the host while most predators are smaller than parasites.
   c. the parasite feeds on a prey and the predator feeds on a host.
   d. both "a" and "b" are true

Quiz No. 2

Review of Parts I and II (Symbiosis, Niches and Succession)

1. The organisms involved in the intraspecific and interspecific interactions of populations make up a (an)
   a. ecosystem
   b. biotic community
   c. niche
   d. habitat

2. The statement that, "a niche is unique for each kind of organism," is known as the
   a. carrying capacity of a habitat
   b. climax principle
   c. competitive exclusion principle
   d. adaptive strategy

3. It can be said that man's ecological niche
   a. does not overlap with other animals' niches
   b. overlaps with just one or two
   c. overlaps with many other animal's niches
   d. is so complex that we can not tell if it does or does not overlap other niches

4. An organism's habitat is
   a. the something as its niche
   b. the general area in which it resides
   c. the type of foods it consumes
   d. none of the above

5. An ecosystem is different from a biotic community in that
   a. it includes both the biotic and abiotic realms
   b. the ecosystem is on a small portionof the biotic community
   c. the word ecosystem just refers to special types of communities that seem to be "systematic"
   d. they really aren't different. Ecosystem is just a new word comed by ecologist

6. The continuous process by which one community is gradually replaced by another is called
   a. competitive exclusion principle
   b. pioneer principle
   c. ecological succession
   d. habitat alteration

7. The typical climax community of Georgia is
   a. Annual weeds such as ragweed and crabgrass
   b. mature pine forrests
   c. deciduous forrests (oak, yellow poplar, etc.)
   d. both b and c

8. Which of the follow best describes a climax community?
   a. stable, many species
   b. unstable few species
   c. will likely change into a new community within a few years
   d. both "b" and "c"

9. In the early stages of succession which of the following organisms are likely to be the dominant plants?
   a. grasses
   b. small oaks
   c. pines
   d. yellow poplars

0. Which of the following would be the best order of energy transfer through a food chain?
   a. sunlight autotraphs herbivores carnivores
   b. sunlight saprophytes herbivores autotrophs
   c. sunlight herbivores carnivores autotraphs
   d. sunlight autotrophs carnivores saprophytes

Keys To Review Quizes

o. 1
b
a
c
c
d
a
c
b
d
a

No. 2

1. b
2. c
3. c
4. c
5. a
6. c
7. d
8. a
9. a
10. a

Blake - Member of Zoning Board of Appeals

You are a member of the Zoning Board of Appeals. You were appointed by the County Commissioners to serve on this important board which considers all request for rezoning or"special exception" zoning in public hearings. In this special exception hearing, your Board's decision is final.

You were a farmer for a number of years, and then five years ago you sold your farm to go into the farm machinery and large equipment business. Generally you are concerned about the neglect of the soil and consider the county to have "overdeveloped" into residential sub-divisions and industries. On the other hand the sale of bulldozers and other large equipment used in development can boost your business which had been in a decline in the current recession year.

Morgan - Member of Zoning Board of Appeals

You are a member of the Zoning Board of Appeals. You were appointed by the County Commissioners to serve on this important board which considers all request for rezoning or "special exception" zoning in public hearings. In this special exception hearing, your Board's decision is final.

You are a lawyer in a family law firm. You are known throughout the county as a leader in environmental causes. You are a member of the National Wildlife Federation and the Sierra Club and are active in the Georgia Conservancy. You are an outspoken advocate of strong enforcement of the ordinance against dumping.

Phillips - Member of Zoning Board of Appeals

You are a member of the Zoning Board of Appeals. You were appointed by the County Commissioners to serve on this important board which considers all request for rezoning or "special exception" zoning in public hearings. In this special exception hearing, your Board's decision is final.

You are an established building contractor who has built many of the larger industrial buildings and business offices in the county in the last ten years. You openly encourage more development for its general economic benefits to the county. You feel that an expansion of industrial and business growth will create more jobs and more income for the county.

Harper - Member of Zoning Board of Appeals

You are a member of the Zoning Board of Appeals. You were appointed by the County Commissioners to serve on this important board which considers all request for rezoning or "special exception" zoning in public hearings. In this special exception hearing, your Board's decision is final.

You are the head of a family plumbing firm. Nearly forty years ago your grandfather started the plumbing business in the county and your family has resided in Gwinnett ever since. You are convinced that growth has brought great progress to the county. Currently you are concerned about the problems of garbage and trash disposal. Disposing of discarded plumbing fixtures, old pipes and such junk has been inconvenient and rather costly since the nearest landfill is privately run and 23 miles from your business.

Miller - Member of Zoning Board of Appeals

You are a member of the Zoning Board of Appeals. You were appointed by the County Commissioners to serve on this important board which considers all request for rezoning or "special exception" zoning in public hearings. In this special exception hearing, your Board's decision is final.

You own a large department store in a large shopping center in the county. Generally you are in favor of rezoning land in and near residential areas to provide the convenience of business or institutional development close to each large subdivision. Recently you have been quite concerned about the inadequacy of garbage and trash collection in the shopping center. You have complained to the Board of Commissioners that the garbage collectors franchised by the county tend to skip the dumpsters in the shopping center on some collection days. You have been encouraging the commissioners to consider some new system of collection.

Fountain - Chairman of Board of Commissioners

You are now serving in your final year as Commission Chairman, a full-time elected position for which you plan to run again. It is, therefore, very important for you to be familiar with the likes and dislikes of the voters. You believe that growth means progress and have encouraged expansion of the business and industry community in the county.

You are joint-owner in a successful heating and air-conditioning firm, now run by your partner. You and your family will not be personally affected by a new landfill, since you live in Lawrenceville. However, you do often hear complaints from Gwinnett Countians about the current sanitation system.

Merritt - County Health Official

You have held your position as Health Inspector for nearly twenty years. You plan to retire in two more years. You are very outspoken in your opinion that Gwinnett started going "downhill" in the 1960's and the descent has been growing more rapid during every year since. You have kept yourself knowledgeable about improvements in public health through the years and are a conscientious citizen in your own way. Having had a considerable amount of experience with the actual operation of landfills, you are concerned with the possible health hazards that could result from locating a landfill so near a highly-populated area.

Bell - Administrative Assistant

You are the newly appointed administrative assistant to the Board of County Commissioners. You have had special training in public administration and five years experience in administration in another Georgia county.

Your job is to take care of the day-to-day tasks of running the county government. The commissioners depend on you to get the facts on any issue that arises and help provide them with details on various county government operations. Because recent press coverage has highlighted the problem of dumping in the county, the Chairman of the Board of Commissioners has asked you to look into the county's waste disposal program and present your evaluation of it.

Altman - Land Owner

You and your business associate, Howard, purchased the Cruse Road property eight years ago when this area was almost completely undeveloped. You thought the land might be a good investment. The land was not considered good land for residential development, but it was relatively inexpensive and located in a section of the county that was obviously increasing in population.

You were contacted by the Sanoclean Corporation last year and offered a good annual income from leasing the land to run a landfill on it. Last month you and Howard met with corporation officials to work out an agreement. Now obtaining permission from the county Zoning Board is an important step in completing the agreement.

You and Howard have invested in other land in Gwinnett and Rockdale Counties. You live in Gwinnett and run a wholesale paper supplies company in Norcross.

Howard - Land Owner

You and your business associate, Altman, purchased the land on Cruse Road eight years ago for an investment. Because you live in Atlanta, Altman has overseen land investments in Gwinnett.

You had previously encouraged Altman to put the land up for sale, but when he called you last month about the Sanoclean leasing deal, you considered that this land might improve in value in the long run. You are convinced that developing the property as a landfill will improve its surface features and eventually after it is all filled in it will be more valuable.

Bernstein - Apartment Owner

You own the apartment complex across the road from the proposed landfill site. You recognize the fact that a landfill is needed in the area near Cruse Road, but object to its location so near to your complex. You fear that property will be devalued and that the area might be less desirable to potential tenants. You attempted and failed to purchase the property in question last year, planning to put up a new apartment complex there.

Burton - Environmental Protection Division Representative

You live in a subdivision north of the Cruse Road area. You work with the Environmental Protection Division of the Department of Agriculture in Atlanta. You have been asked to appear before the board in the interest of a group of citizens who are concerned by the ever-increasing development in the Cruse Road area. You hold a Ph.D. degree in Environmental Science from the University of California at Berkeley and did your undergraduate work in Zoology at the University of Georgia.

Monroe - Farmer, Member of Board of Commissioners

You are 52 years old and have lived in Gwinnett County all your life. You have three married daughters and four grandchildren, all of whom live in the county. You own a moderate-sized farm near Snellville, which is operated by one of your sons-in-law. You consider yourself semi-retired, but serve as a member of the Board of Commissioners because you are actively concerned about the county.

You have witnessed the local population explosion and feel that Gwinnett does not need any more people or industry. You have been distressed by the acres and acres of fertile farmland and forest that have been destroyed for development in the name of progress. For this reason, you are intensely interested in any land use decisions.

Evans - Western Electric Plant manager, Member Board of Commissioners

You moved to Gwinnett County from Ohio only five years ago to become plant manager at Western Electric. You are rather young to hold such a position; however, you are highly intelligent and ambitious person. You became actively involved in the community almost immediately upon your arrival, bringing to your civic activities the same enthusiasm and vitality that you show on the job. You are presently a member of the Board of Commissioners and plan to run against Fountain in the upcoming race for Commission Chairman.

You are for adopting a "no-growth" policy in Gwinnett County and feel that the county should provide sanitation service for the citizens.

Livingston - Agent of Resource Conservation and Development Service

You are 28 years old and a recent addition to the staff of the Gwinnett County Resource Conservation and Development Service, a division of the U.S. Soil Conservation Service. You received a master's degree in Agronomy from North Carolina State University with emphasis on soil conservation. You worked for three years as an assistant conservationist in Raleigh before being transferred to Gwinnett. You consider that it is part of your job to be interested in any actions taken in the county which could have negative environmental effects.

Stanley: State Soil Conservationist

You are a State Soil Conservationist for Georgia, with an office in Athens. You have been asked by Livingston to study the situation in question, since you have more experience in the area. You have lived in the North Georgia area for nearly all of your life and are familiar with its environmental peculiarities.

Hayes - Professional Planner

You are a professional planner who works for the Planning and Zoning Division of the county government. You are a trained and experienced community planner who left a city planning job to take the job in Gwinnett in 1970 when the major land use plan for the county was developed.

You are generally opposed to mixing residential, commercial and institutional zoning in patchwork patterns and strive to encourage the development of protected strips which protect property values and economic and social development.

Widener - Professional Planner

You are a professional planner who works for the Planning and Zoning Division of the county government. You joined the Gwinnett planning staff after completion of training at a large southeastern university two years ago.

Generally you favor cluster zoning in the areas not yet developed. Also you encourage the commissioners to consider setting aside more park area and open land as the county develops. You are currently involved in preparing a report for the county administrator summarizing solid waste disposal problems in the county and suggesting possible alternatives for county action.

Metcalf - ARC Representative

You are a member of the professional staff of the Atlanta Regional Commission. Trained as a geologist, you were hired on the ARC staff two years ago to aid in the preparation of information summaries and maps of the land characteristics of the metro region. You recently completed studies of drainage, rock and soil characteristics of the area.

Organized homeowners who want to block the proposed landfill location have called you to come to the hearing and testify about the potential negative impact the landfill will have on the area.

Morrison - School Board President

You are the current president of the county Board of Education. Recently while checking over progress on the construction of the new high school on Cruse Road you noticed the sign on the adjacent property advertising the hearing for special exception zoning. You are very concerned that the proposed development of that land is for a landfill. Although this proximity of a landfill will have its advantages for easy waste disposal by the nearby high schools, you are concerned about the traffic hazards and the possibility that the landfill will not be properly operated so as to keep the area sanitary and healthy. Many school board members have objected to the location of the landfill in this school zone, and you plan to attend the hearing to listen and offer some remarks.

Michaels: Home Owner

You are a private home owner in a subdivision located near the proposed landfill off Cruse Road. You have organized other home owners to fight against the special exception request. You fear that garbage trucks and commercial trucks driving in and out of the landfill will cause a real traffic hazard for both children and adults. Also, you are concerned that trash and garbage from these vehicles may be blown off or drop off onto the surrounding property of the area making the whole neighborhood unsightly.

Caproni - Home Owner

You are a new home owner who lives on Pleasant Hill Road not far from the intersection with Cruse Road. You are greatly concerned about the effect the landfill may have on the value of your property and that of your neighbors. You have joined with Michaels in organizing local residents to fight against the location of a landfill in the area. You plan to attend the hearing to speak against the landfill.

Janecki - Representative of Sanoclean Landfill Corporation

You are 55 years old, married with two adult sons. You have held a variety of occupations in your life, but worked as a truck driver for 15 years. Through a combination of thrift and wise investments, you were able to form Sanoclean in 1968. You currently operate four landfills in surrounding counties. You personally hire and train your operators. The Cruse Road property with its gullies and pits appears to be a good location for another fill.

Calhoun - Attorney for Land-owners

You are an Atlanta lawyer hired to handle this case for the land-owner who wishes to have his property developed as a commercial landfill. You have looked into legal aspects of this case and found that the zoning regulations of the county allow a proposal for landfill to be considered in any type of zoning except flood hazard zoning. You have advised your client to go before the Zoning Board of Appeals and request special exception zoning of his M-1 zoned land.

You plan to attend the hearing to argue that this procedure is entirely acceptable under the law. You also hope to convince any objectors that the commercial landfill will be a sanitary operation run according to state legal standards.

Wiley - Construction Engineer

You are 23 years old and have recently received a degree in Construction Engineering from Georgia Tech. You were a senior at Berkmar during the first year of its operation and feel loyalty to the school. You fear that the locality might be degraded by the location of a landfill there.

Your apartment faces Cruse Road and directly overlooks the proposed site. You are concerned about the possibility of foul odors, loud noises, and destruction of the beauty of your view. You have however, explored the site and feel that it would probably not be useful for any other kind of development. It is also possible that, when the landfill is completed, the condition of the land will be improved. You want to know more about the situation before formulating an opinion.

Sanders - Realtor

You are a realtor, whose financial success is more or less dependent upon population growth and property values. You moved to Gwinnett twelve years ago from Atlanta, having foreseen the suburban migration as an inevitable result of ever-increasing crowding in Georgia's capital.

You believe that the proposed landfill would have little effect on property values if operated properly. Sanoclean plans to leave a stand of trees adjacent to the road, shielding the operation from view. Daily covering of the trash should effectively prevent foul odors.

You believe that most home owners will be glad to have a landfill so conveniently located.

Victor - Apartment Dweller

You are 32 years old, married, with twin 8-year-old sons. You are an accountant for a local business firm and have lived in Gwinnett for six years. You represent a group of concerned residents from the apartment complex across the road from the proposed site. You and your neighbors are concerned about the potential dangers that might exist for curious kids who habitually play together in that currently vacant lot. You also feel that development has already destroyed too much of the scenic natural areas of Georgia.

Allen - Insurance Salesperson, Member Board of Commissioners

You are 37 years old and parent of a 9-year-old son and a 13-year-old daughter. You own a $40,000 home near the site under consideration. It is very likely that your daughter will attend the new school when it is built. You sell all types of insurance, but have done very well in recent years by concentrating your efforts in the area of property insurance. You are, of course, interested and concerned about the effects that a landfill would have on property values, especially since your company insures the apartment complex just across the road from the proposed site.